REMARKS

Summary of the Office Action

Claims 1, 2, 3, 5 and 6 remain rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by U.S. Patent No. 6,564,009 to Owa et al. (hereinafter "Owa").

Claim 4 remains rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Owa in view of U.S. Patent No. 6,243,350 to Knight et al. (hereinafter "Knight").

Rejections under 35 U.S.C. §§ 102(b) and 103(a)

In the Final Office Action, claims 1, 2, 3, 5 and 6 remain rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Owa, and claim 4 remains rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Owa in view of Knight. Applicants respectfully traverse the rejections for at least the following reasons.

Description of Embodiments of the Present Invention

A molded glass objective lens 16a in an embodiment of the present invention, as shown in Fig. 2 for example, includes a first surface 21 having a center symmetric convex surface shape at least in a range of an optical beam passing therethrough, a second surface 22 having a center symmetric effective surface shape at least in a range of an optical beam passing therethrough on a side opposite to the first surface 21, and a center symmetric cylindrical side surface 23 crossing with the first surface 21.

The molded glass objective lens 16a is characterized by satisfying the following formula:

$$(3V_1/4\pi)^{1/3} \leq rA < (3V_2/4\pi)^{1/3}$$

wherein

rA is a center curvature radius of the first surface 21 of the molded glass objective 16a,

V_1 is a volume of the molded glass objective lens 16a, and

V_2 is a volume of a virtual lens portion 160 surrounded by a cylindrical surface including the first and second surfaces 21, 22 and the cylindrical side surface 23.

Applicants respectfully submit that it will be understood that the center curvature radius rA falls within a range between radii of respective spheres having the V_1 and V_2 of preformed glass balls which may be utilized for molding the molded glass objective 16a.

To clarify the center curvature radius rA of the first surface 21 of the molded glass objective 16a, Applicants suppose that X_1 represents a radius of a sphere having the volume V_1 and X_2 represents a radius of a sphere having the volume V_2. That is,

$$V_2 = 4\pi(X_2)^3/3$$

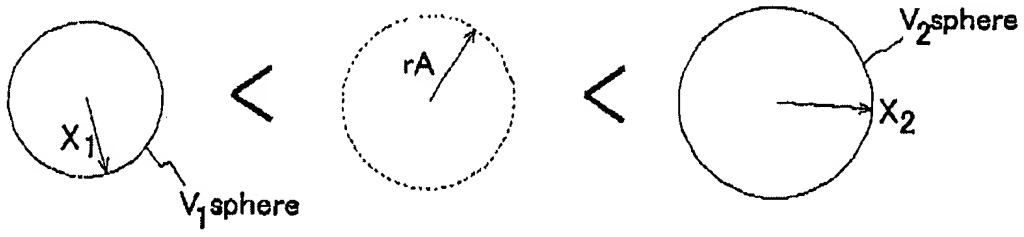
$$V_1 = 4\pi(X_1)^3/3$$

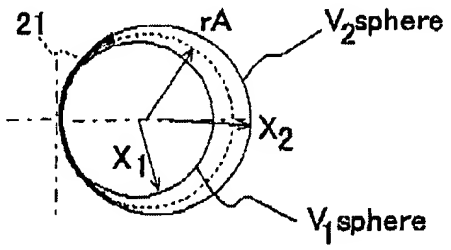
By substituting these equations into the formula discussed above, the following results are obtained:

$$4\pi(X_1)^3/3 \leq 4\pi(rA)^3/3 < 4\pi(X_2)^3/3$$

$$X_1 \leq rA < X_2$$

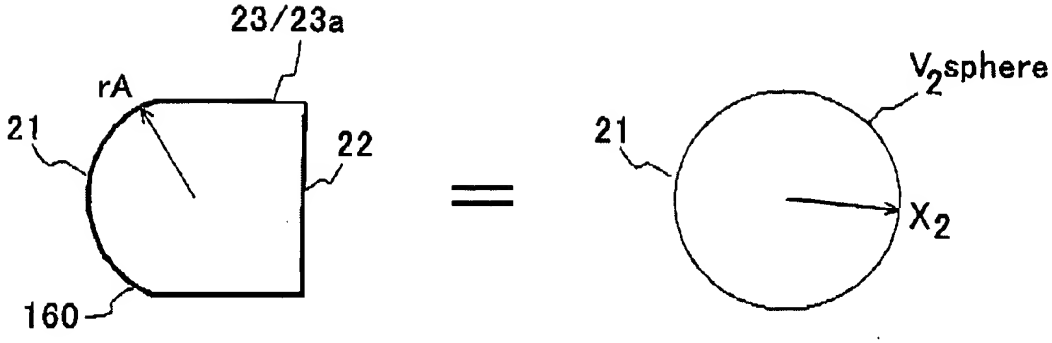
Applicants respectfully submit that it will be understood that a volume of a sphere which may be used for molding the molded glass objective 16a as a preformed glass ball, falls within the range between the smallest volume V_1 and the largest volume V_2 spheres, as illustrated below.



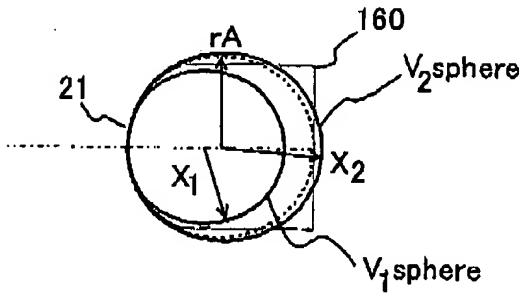


(1)

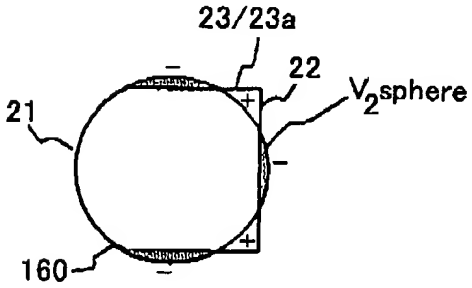
As seen from the above figure, the outstanding inequality shows a range of the first surface's center curvature radius rA of the first surface 21 in a desired molded glass objective 16a. However, it is necessary to amend this figure because the V_2 sphere has the same volume of the virtual lens portion 160 surrounded by the cylindrical surface 23/23a including the first and second surfaces 21, 22 as recited in claim 1, as illustrated below.



Therefore, the figure (1) should be amended as follows:



Press mold



As seen from the above figure and as described at page 10, line 27 - page 11, line 7 of the specification of the instant application, the volume of the molded glass objective lens 16a is determined so as to be less than that of the largest preformed

glass ball having a center curvature radius rA of the first surface 21. As a result, the press molding of the second lens 16a is possible by using the preformed ball having such radius in the largest. Therefore, the center curvature radius rA, as a dotted line, is almost equal to but less than the radius X_2 of the preformed ball.

Applicants respectfully submit that in this way, the present invention contributes toward realizing the glass molding of a thick lens with light condensing power, because it is conventionally limited due to the limitation that the diameter of the preformed ball should be smaller than the center curvature radius of the lens's first surface.

Response to the Rejections in Final Office Action

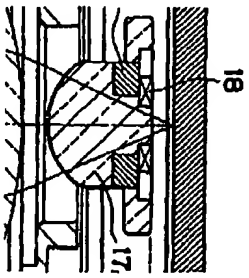
The Final Office Action alleges at page 2 that, due to the presence of the cylindrical section of Owa's lens 17A, the center curvature radius of the first surface must be greater than $(3V_1/4\pi)^{1/3}$, where V_1 is the molded glass objective lens volume, i.e., "$(3V_1/4\pi)^{1/3} \leq rA$." Then, the Final Office Action goes on to assert that the radius of a sphere would be equal to $(3V_s/4\pi)^{1/3}$, where V_S is the volume of a sphere. The Final Office Action further asserts that, due to the presence of the notched section of Owa's lens 17A, the center curvature radius must be less than $(3V_2/4\pi)^{1/3}$, where V_2 is a virtual lens portion volume, i.e., " $rA < (3V_2/4\pi)^{1/3}$" where "V_2 denotes the volume of a virtual lens portion" as recited in independent claims 1, 5 and 6. Applicants respectfully disagree.

Applicants respectfully submit that at least this particular assertion reflects a misunderstanding. Owa's lens 17A has a center curvature radius of the first surface $rA > (3V_2/4\pi)^{1/3}$. The Owa reference merely discloses a conventional mold thin lens limited in that the diameter of the preformed ball should be smaller than the center curvature radius of the lens's first surface.

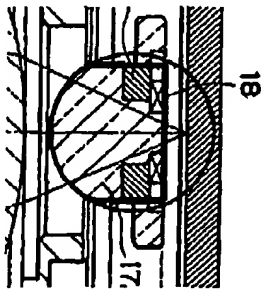
In an effort to explain how the combinations recited in the instant application's claims differ from any teaching in Owa, Applicants execute a quadrature or mensuration by

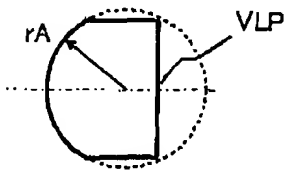
parts to approximate a volume of a virtual lens portion in Owa's lens 17A, on the basis of the cross-sectional view shown in Fig. 8, to compare the center curvature radius of the first surface rA of Owa with that of embodiments of the present invention in the following procedures.

Applicants extract a portion related to the lens 17A from Fig. 8 of Owa as follows:

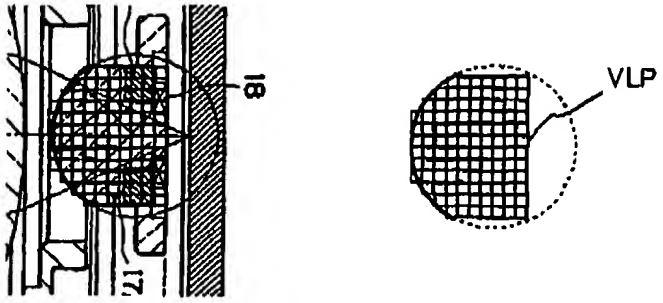


Applicants make a tracing of the center curvature radius rA (shown by a dotted line on the right side of the following figure) of the first surface of lens 17A and the virtual lens portion VLP (shown by a solid line on the right side of the following figure). The virtual lens portion includes the notched sections for the modulation coil 18 and the heat radiating plate 17E in Fig. 8 of Owa.

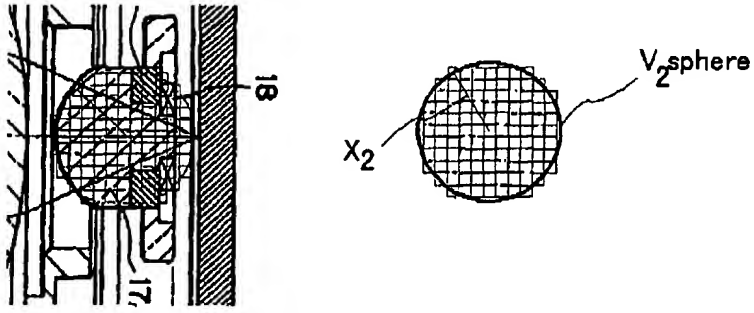




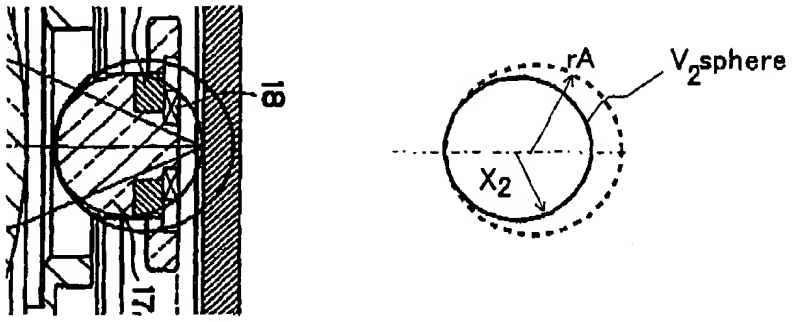
Applicants fill the virtual lens portion VLP with pieces of unit squares to measure a volume thereof as shown below, and thus determine that 108 pieces are required. Unit squares having an easily visible size are utilized to assist in comprehension.



Subsequently, by re-arranging the 108 squares in the form of a circle, Applicants create a circle which is regularly filled with 108 unit squares to estimate a volume of the V_2 sphere to be equal to that of the virtual lens portion VLP. Thus, Applicants measure a radius X_2 of the V_2 sphere as follows:



Applicants inscribe the circle of radius X_2 on the circle of radius rA measured (shown by a dotted line) as follows:



As a result, the radius X_2 of the V_2 sphere (having the volume of the virtual lens portion VLP) is less than the center curvature radius rA of the first surface of Owa's object lens 17A , namely, $rA > (3V_2/4\pi)^{1/3}$.

For at least the foregoing reasons, Applicants respectfully submit that the Final Office Action's assertion of "$rA < (3V_2/ 4\pi)^{1/3}$ " is improper. Further, Owa does not discuss, to any extent, whether or not a radius of the first surface of the lens 17A is nearly equal to or less than that of a glass mold ball which is used to form the object lens 17A. Thus, Applicants respectfully submit that Owa's object lens 17A does not fall within the equation of "$(3V_1/4\pi)^{1/3} \leq rA < (3V_2/4\pi)^{1/3}$" to any extent. Furthermore, Owa merely discloses that the first lens 17A may be formed by the glass mold but neither teaches nor suggests that the first lens 17A may be formed by a preformed glass ball.

Accordingly, Applicants respectfully assert that the rejection under 35 U.S.C. § 102(e) should be withdrawn because Owa does not teach or suggest each feature of independent claims 1, 5 and 6. As pointed out in MPEP § 2131, "[t]o anticipate a claim, the reference must teach every element of the claim." Thus, "[a] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. Verdegaal Bros. v. Union Oil Co. Of California, 2 USPQ 2d 1051, 1053 (Fed. Cir.

1987)." Furthermore, Applicants respectfully assert that dependent claims 2-3 are allowable at least because of their dependencies from independent claim 1, and the reasons set forth above.

Moreover, with respect to the rejection of claim 4 under 35 U.S.C. § 103(a), Applicants respectfully submit that Knight does not cure the above-discussed deficiencies of Owa. Accordingly, claim 4 is also in condition for allowance at least because of its dependence from independent claim 1, and the reasons set forth above.

CONCLUSION

In view of the foregoing remarks, Applicants respectfully request reconsideration of this application, withdrawal of all rejections, and the timely allowance of all pending claims 1-6.

Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite the prosecution.

EXCEPT for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. §§ 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account 50-0310. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,

MORGAN, LEWIS & BOCKIUS LLP

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